

## CLAIMS

1. A symbol position detection device detecting a position  
for a symbol of a data signal transmitted based on a first clock  
5 signal having a predetermined frequency, the device comprising:

high frequency clock signal generation means for generating  
a second clock signal having a frequency of an integral multiple  
of a frequency of the first clock signal;

data value acquisition means for acquiring a data value of  
10 the data signal based on timing of the second clock signal generated  
by the high frequency clock signal generation means;

clock component extraction means for extracting a component  
of the first clock signal from the data value acquired by the data  
value acquisition means;

15 zero cross detection means for detecting, as a zero cross  
point, a timing at which a magnitude relationship with respect  
to a predetermined criterion level inverted for the component of  
the first clock signal extracted by the clock component extraction  
means; and

20 symbol position detection means for detecting, as a symbol  
position of the data signal, a time when a time period corresponding  
to a predetermined number of clocks for the second clock signal  
is elapsed from the zero cross point detected by the zero cross  
detection means.

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2. The symbol position detection device according to claim 1, wherein the data signal is a signal in which the magnitude relationship with respect to the predetermined criterion level is alternately inverted from symbol to symbol.

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3. The symbol position detection device according to claim 1, wherein the zero cross detection means detects, as the zero cross point, a clock whose position corresponding to a timing closest to the timing at which the magnitude relationship with respect to the predetermined criterion level is inverted for the first clock component extracted by the clock component extraction means.

4. The symbol position detection device according to claim 3, wherein the zero cross detection means compares an absolute value of a data value for a clock immediately before and an absolute value of a data value for a clock immediately after the timing at which the magnitude relationship between the data value and the predetermined criterion level is inverted for the first clock component extracted by the clock component extraction means, and determines that the clock of which the absolute value of the data value is the smaller is a clock whose position corresponding to a timing closest to the timing at which the magnitude relationship with respect to the predetermined criterion level is inverted.

5. The symbol position detection device according to claim 1, wherein the clock determined as being at a position of the symbol in the data signal by the symbol position detection means is at a timing at which the predetermined number of clocks is passed from the zero cross point.

6. The symbol position detection device according to claim 1, wherein the symbol position detection means outputs a third clock signal with a timing when the symbol position is detected.

7. The symbol position detection device according to claim 6, wherein the zero cross detection means outputs the third clock signal when the time period corresponding to the predetermined number of clocks is elapsed from the zero cross point.

8. The symbol position detection device according to claim 7 further comprising determination means for determining a data value of the symbol in the data signal, based on timing of the third clock signal outputted by the symbol position detection means.

9. The symbol position detection device according to claim 8 further comprising:

output clock signal generation means for generating a low jitter fourth clock signal; and

output means for externally outputting the data value determined by the determination means, based on the fourth clock  
5 signal generated by the output clock signal generation means.

10. The symbol position detection device according to claim 1, wherein the zero cross detection means detects, as the zero cross point, a timing at which a "positive"/"negative" sign  
10 of the first clock signal component extracted by the clock component extraction means is inverted.

11. The symbol position detection device according to claim 1, wherein the zero cross detection means detects, as the  
15 zero cross point, the timing at which the "positive" /"negative" sign of the first clock signal component is inverted.

12. The symbol position detection device according to claim 11, wherein the data signal is a signal in which the  
20 "positive"/"negative" sign of the data value is alternately inverted from symbol to symbol.

13. The symbol position detection device according to claim 9, wherein output clock generation means generates the fourth  
25 clock signal on the basis of the third clock signal.

14. The symbol position detection device according to claim 1, wherein the integer is a multiple of four.

5 15. The symbol position detection device according to claim 5, wherein

the integer is a multiple of four; and

the predetermined number of clocks is a number of clocks in which the number is obtained by multiplying one-fourth with  
10 the multiple of four.

16. A symbol position detection method for detecting a position of a symbol in a data signal transmitted based on a first clock signal having a predetermined frequency, the method  
15 comprising:

a high frequency clock signal generation step of generating a second clock signal having a frequency of an integral multiple of a frequency of the first clock signal;

a data value acquisition step of acquiring a data value of  
20 the data signal based on timing of the second clock signal generated by the high frequency clock signal generation step;

a clock component extraction step of extracting a data value acquired by the data value acquisition step or a component of the first clock signal;

25 a zero cross detection step of extracting, as a zero cross

point, a timing at which a magnitude relationship with respect to a predetermined criterion level is inverted for the first clock signal extracted by the clock component extraction means; and

5 a symbol position detection step of detecting, as a symbol position of the data signal, a time when a time period corresponding to a predetermined number of clocks for the second clock signal is elapsed from the zero cross point detected by the zero cross detection step.

10 17. The symbol position detection method according to claim 16, wherein the data signal is a signal in which the magnitude relationship with respect to the predetermined criterion level is alternately inverted from symbol to symbol.